ebg MedAustron

cosylab
CONTROL SYSTEM LABORATORY

Main Timing System Overview

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… on behalf of CSL MA team

the best people make cosylab

Outline

- …CWO-1
- overview & role; timing system
- operational view (run, cycles, events)
- main timing generator, MTG
- transport layer / MRF
- main timing receiver, MTR (EVR link to EUC)
- CWO-2…

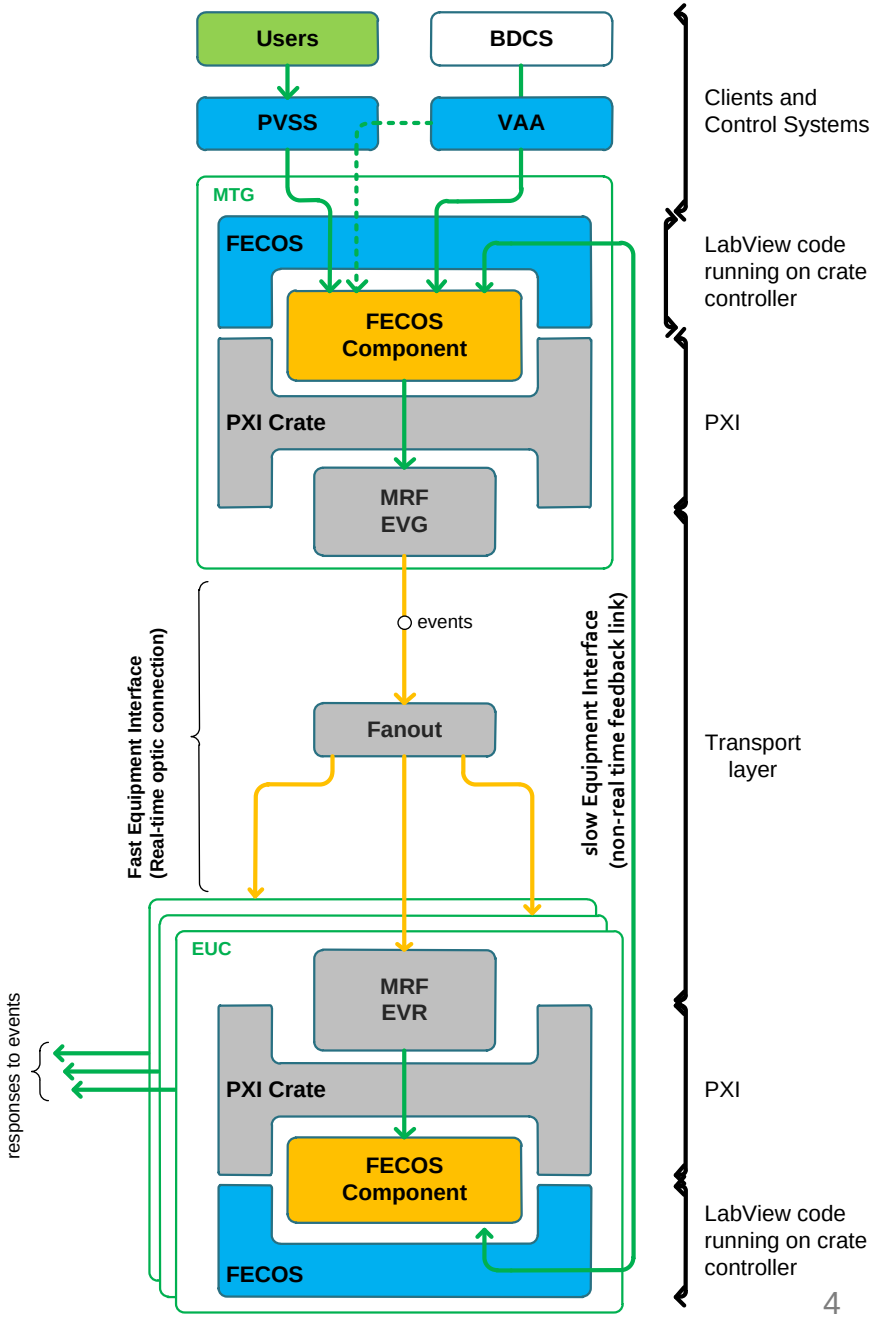
Timing activities in CWO-1

- studied & refined requirements (simplified☺)
- moved reqs. to EA model (traceability)
- made high-level architecture design
- did a step further to allow better architectural decisions (CWO-2)
  - MRF internal FPGA development (..NDA)
  - MRF integration to LV RT

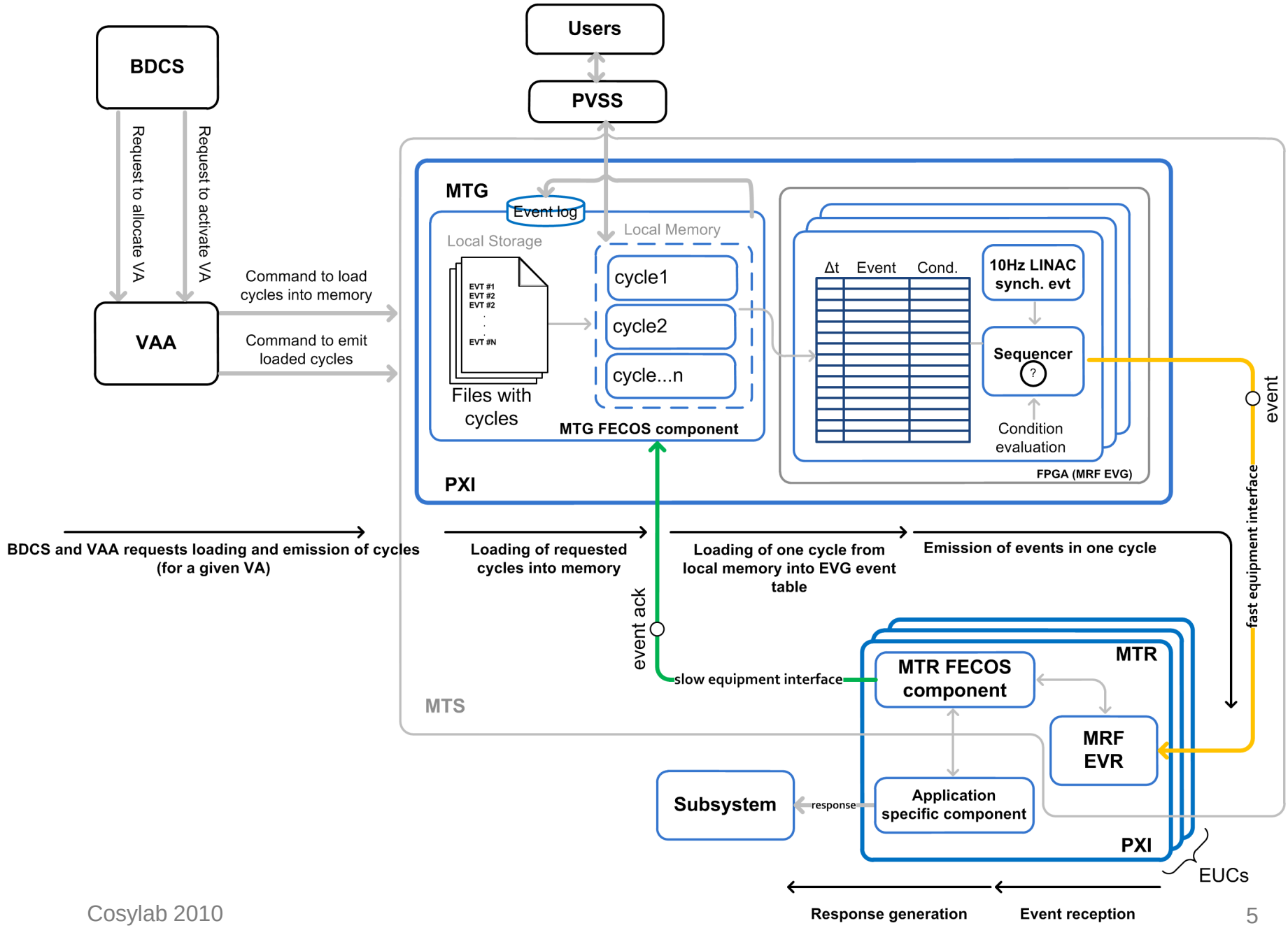
Overview & role;

- prepare data
- process data in hard real-time
- make sure everybody gets it @ the same time (200m = ~1μs)
- decode events and poke equipment

- CS
1. MTS
2. transport
3. receivers w. equipment

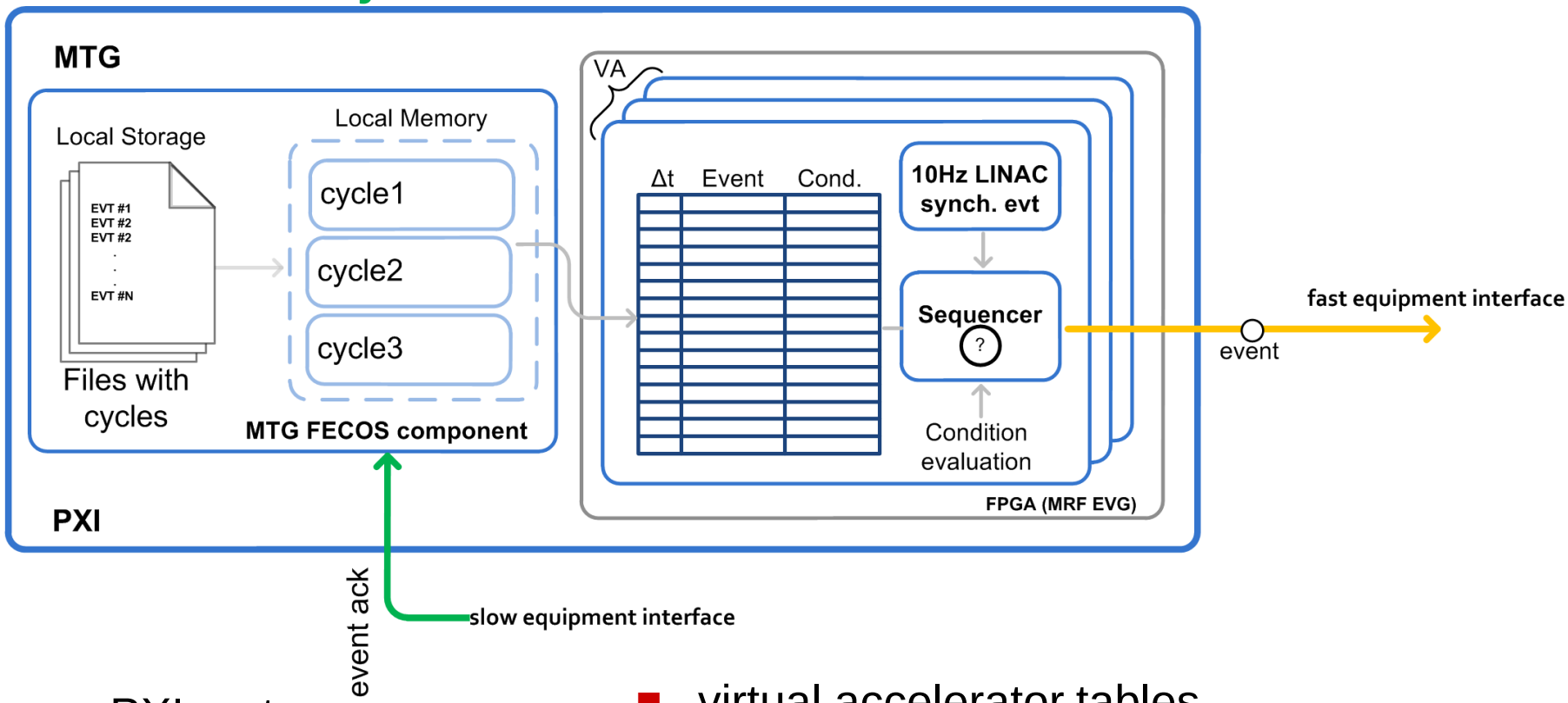


Operational view



Main timing generator, MTG

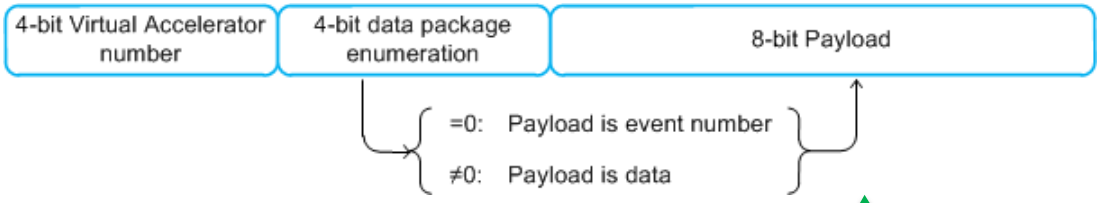
flexibility **hard real time exection**



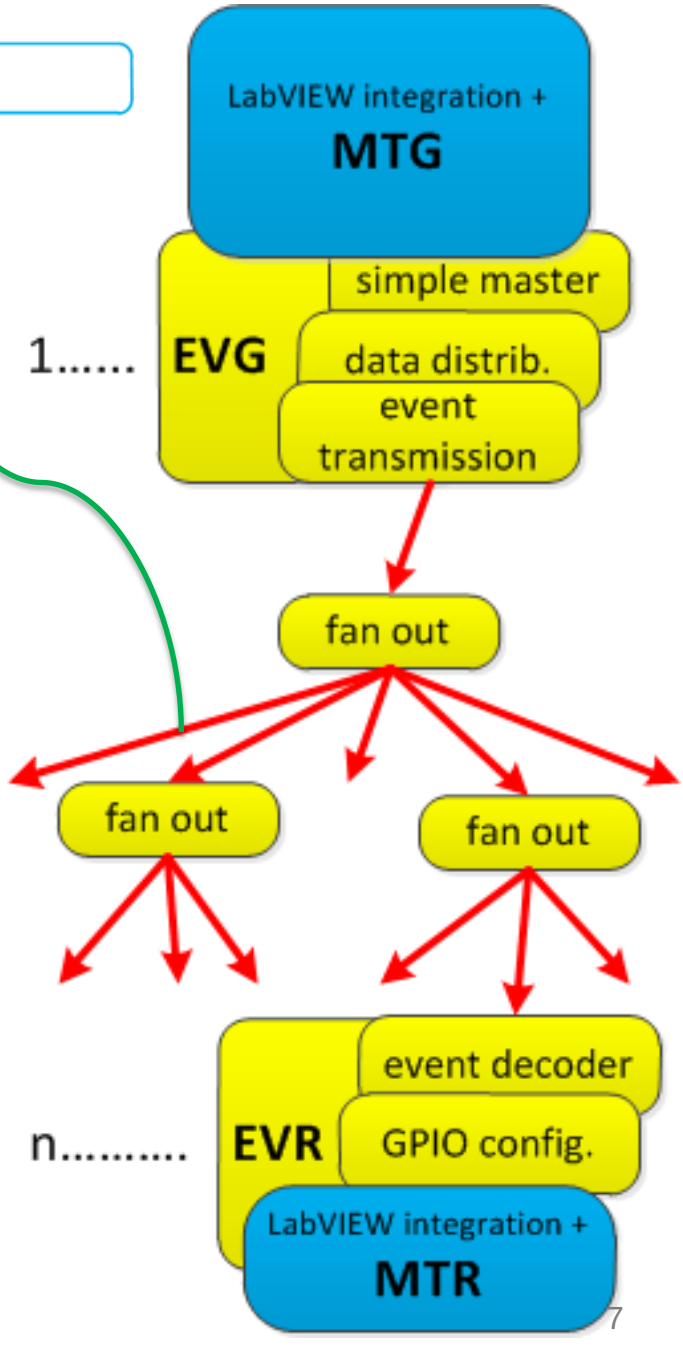
- PXI crate
- controller
- LV RT
- MRF EVG

- virtual accelerator tables (priorities)
- asynchronously transmitted user data
  - linac 10 Hz stability pulse…

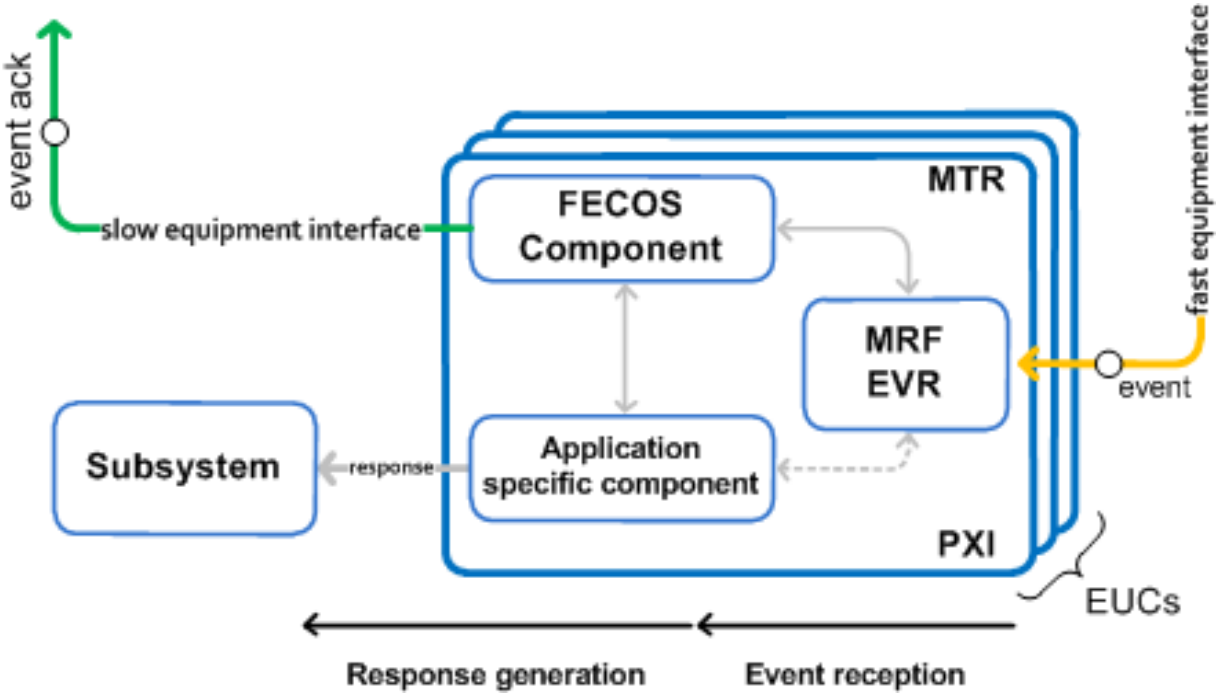
Transport layer / MRF



- hard real-time performance
  - 16b events/data @ 125 MHz
  - typ. 25ps jitter
  - 8ns output resolution
  - simplistic & robust transport layer
- product used at many accs.
  - SLS, DLS, ASP, SSRF, Elettra, ALBA…
- CSL and MRF collaborate
  - R&D support
- MA specific customization:
  - LV support
  - specific MTG functionality
  - EVR wrapper



Main timing receiver, MTR



- events / (asynch.) user data @125M
- (HW) real-time response

- trigger equipment via univ. IO module (electrical or optical signal)
- trigger application via IRQ
- trigger neighboring cards via the 8 bit PXI real-time bus
- provide time stamp functionality
- (offline) configure
  - which events to listen in which VA
  - how to respond

CWO-2 activities

- distribute and agree MTS requirements with all WP holders
- finalize MTS architecture
- define verification procedure; FAT/SAT
- set up mockup demo of MTS
- work towards final implementation

Sync or swim

- timing and synchronization system from 1917
- twin Vickers machine guns, synchronized to fire at 500 rounds/min between the blades of the propeller rotating in front of them
- In the event of a timing error, a few hits on the wooden blades were sufficient for the plane's own propeller to be shot away.

Sopwith Camel